GIS Activities within the National Ocean Service

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Abstract

This presentation will focus on selected geospatial activities within the National Ocean Service and specifically at the Coastal Services Center. We will highlight key spatial data sets created and maintained by NOS, along with applications, tutorials, and other resources available to users of this information.

GIS Activities within NOAA's Ocean Service

Tony LaVoi
NOAA Coastal Services Center

GIS Tools Supporting Ecosystem Approaches to Management
September 8-10, 2004

Selected GIS Activities within NOAA's Ocean Service Related to Fishery Management *(not including NCCOS)*

Tony LaVoi
NOAA Coastal Services Center

GIS Tools Supporting Ecosystem Approaches to Management
September 8-10, 2004

General Outline

- Datasets and tools
- Applications and products
- Coordination and training

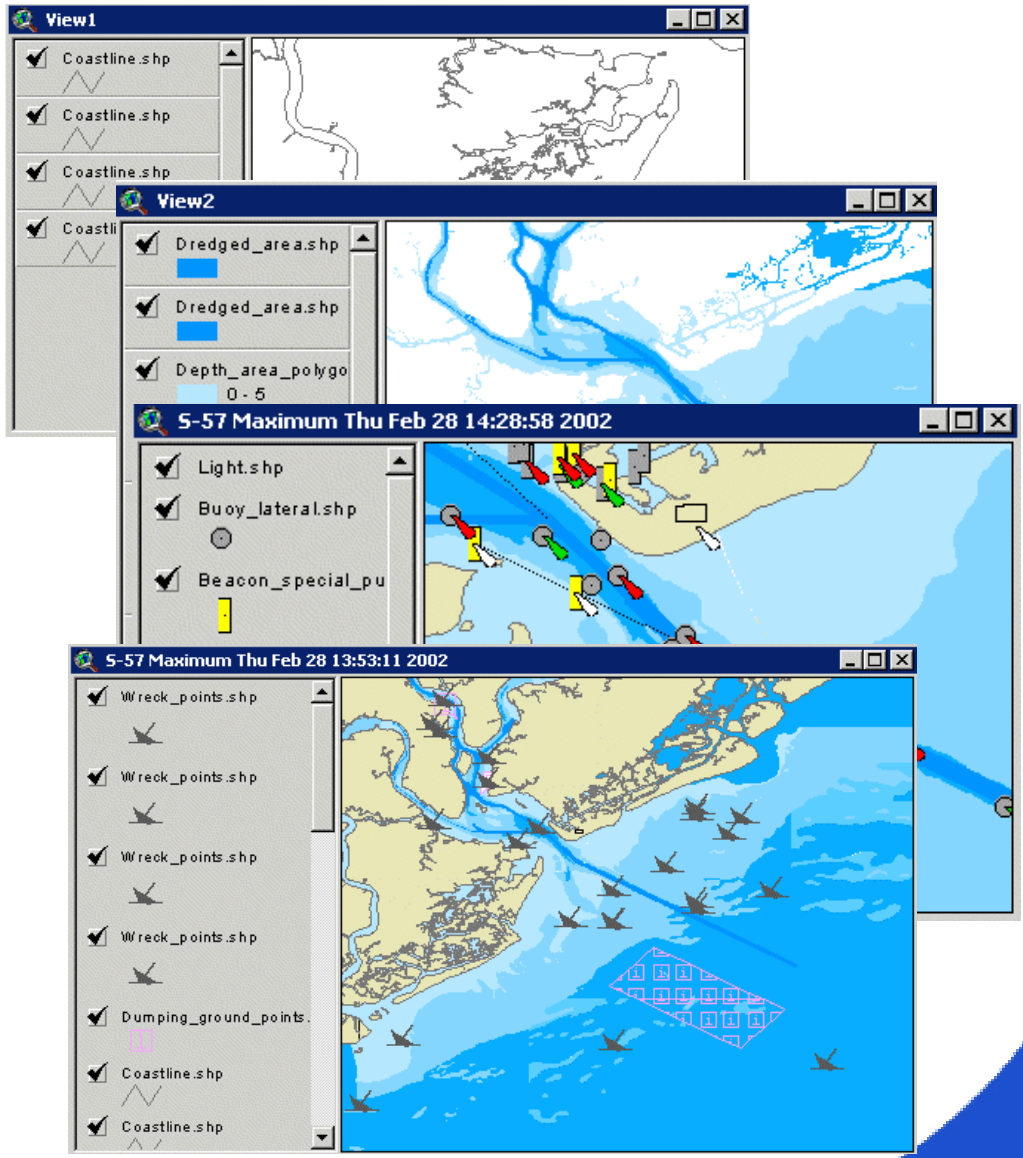
Electronic Navigational Charts

- Electronic Navigational Chart (ENCs) – a special type of vector chart
- Produced by Office of Coast Survey
- More than a map - a database of chart features
- Produced using the International Hydrographic Organization S-57 Standard
- User can display selected layers within a GIS or navigation system

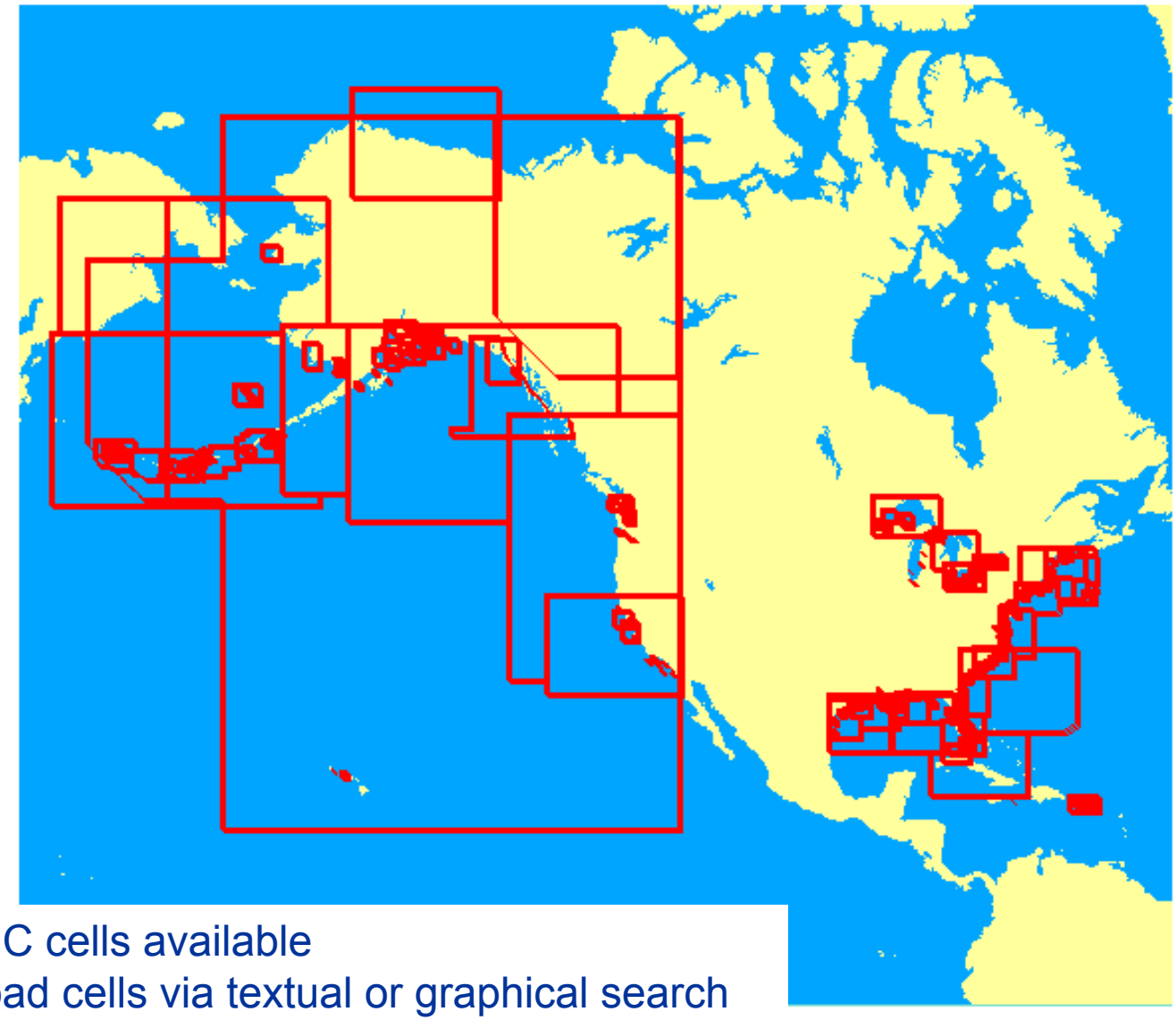
http://chartmaker.ncd.noaa.gov/mcd/enc/

Potential Applications of ENC data

- Coastal mapping
  - base maps
  - bathymetry
  - shoreline
  - aids to navigation
- Environmental assessment
  - channels
  - caution areas
  - high traffic zones
  - marinas
- Resource management
  - dredged areas
  - bottom types
  - wrecks and obstructions
  - boundaries



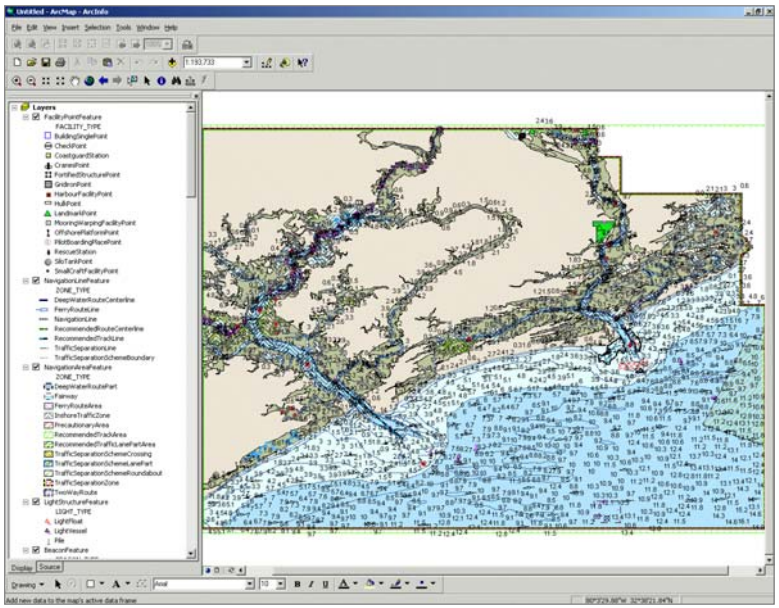
ENC Coverage Area



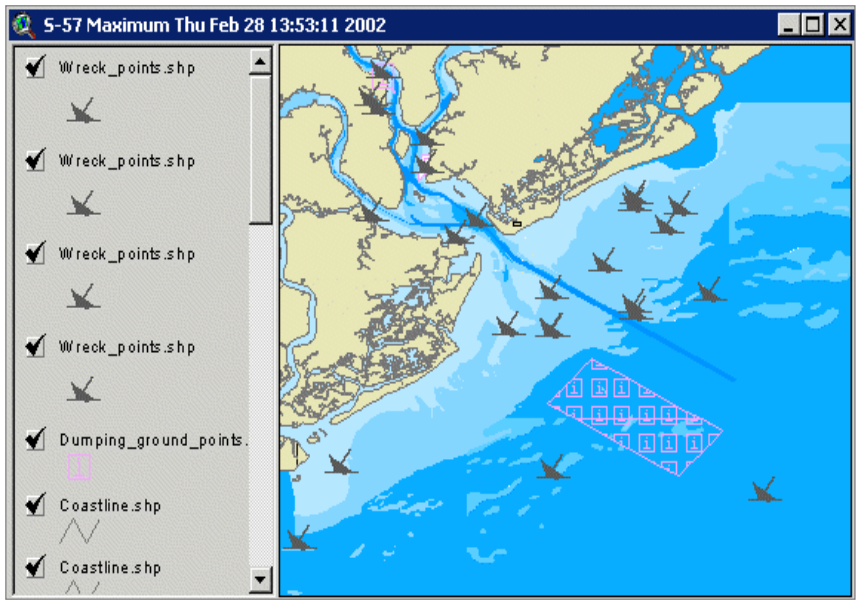
- 429 ENC cells available
- Download cells via textual or graphical search

CSC ENC Desktop GIS Tools

ENC Data Handler for ArcView 8.x



ENC Data Handler for ArcView 3.x

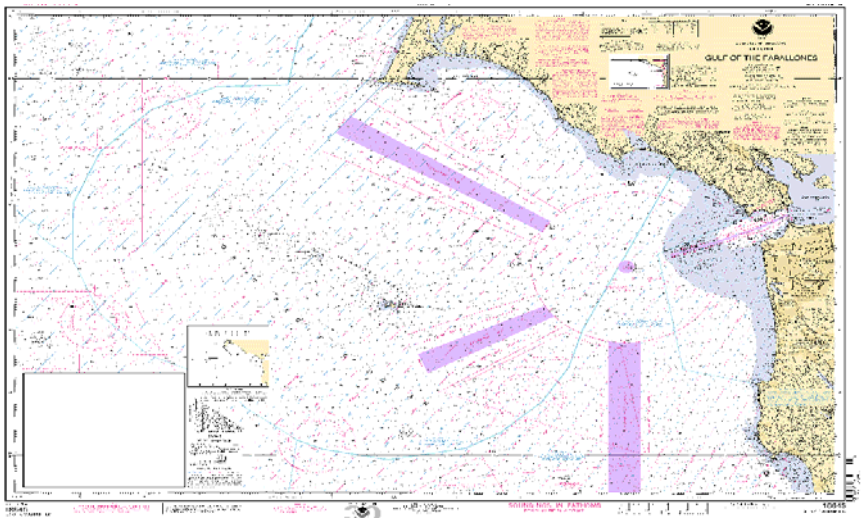


* Other free viewing and display tools are available. The Office of Coast Survey maintains a list of selected tools on their ENC Web site.

http://www.csc.noaa.gov/products/enc/

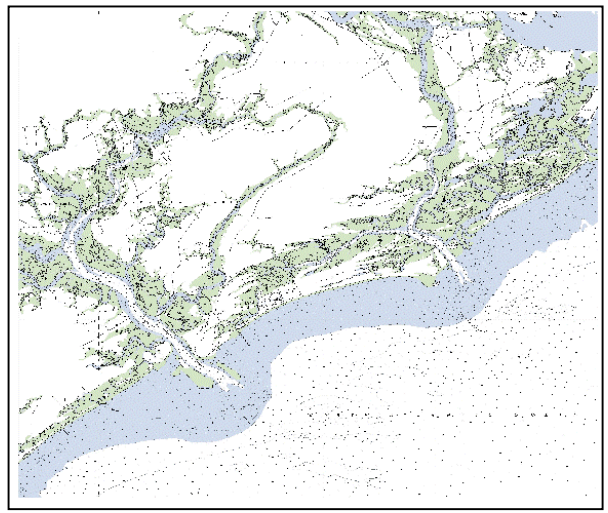
NOAA Nautical Charts

Raster Nautical Charts (RNCs)



- Georeferenced, digital image of NOAA paper chart
- Available for fee from MapTech
- Proprietary format

Coastal Map Series

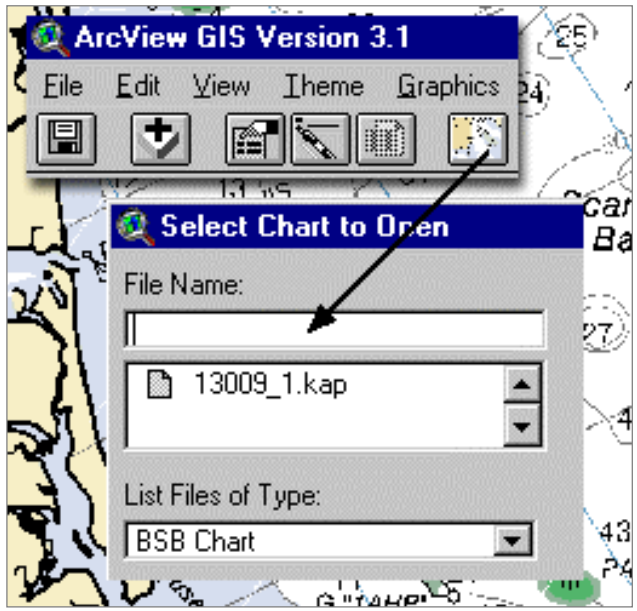


- Non-proprietary format
- Not for navigation
- GEOTIFF

RNC = http://www.maptech.com
CMS = http://nauticalcharts.noaa.gov/csdl/ctp/cm_vs.htm

CSC Tools for MapTech RNCs

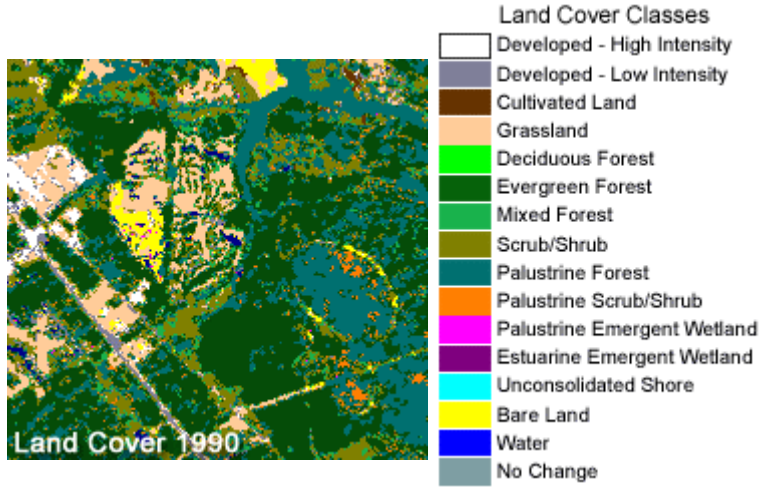
- CSC developed a series of desktop extensions for users to access NOAA RNCs distributed by MapTech
- Three versions - ArcView 3.x, Imagine 8, and ArcGIS 8.x
- Also developed Chart Reprojecter, a stand-alone application that changes the projection of a chart, creating a new file in BSB or TIFF format
- Current release of MapTech charts are encrypted and not viewable using CSC tools – ArcGIS tools available from MapTech



http://www.csc.noaa.gov/products/chartview/

Land Cover and Change Data

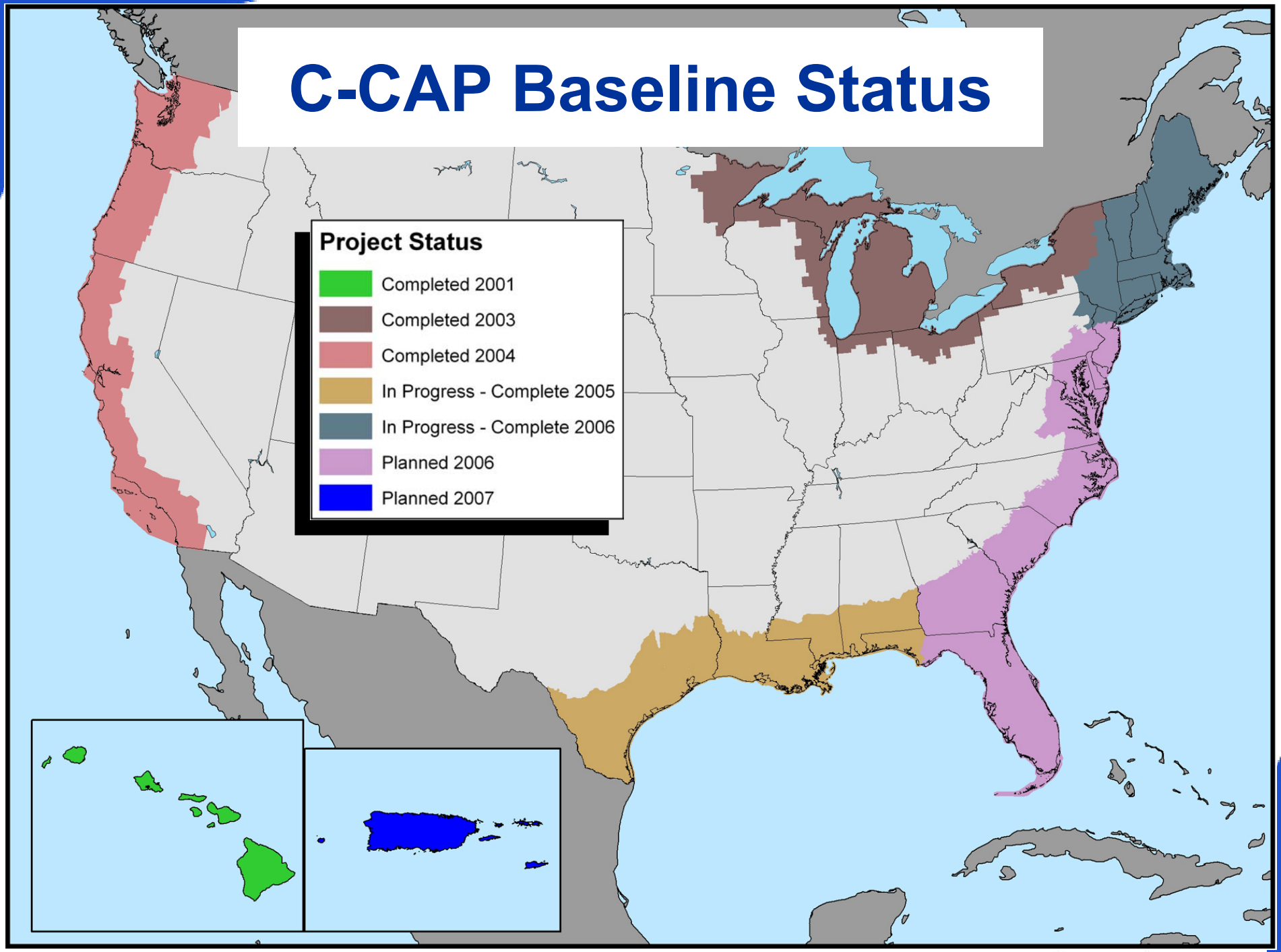
- Coastal Change Analysis Program (C-CAP) is dedicated to the development, distribution, and application of land cover and *change* data for the nation's coastal zone
- Landsat TM-based (30-meter resolution) but exploring “next generation” data
- Coordinated with USGS National Land Cover Dataset (NLCD) effort
- A digital map product-line
  - Land cover - time 1
    (~ current year)
  - Land cover - time 2
    (~5-year retrospective)
  - Retrospective *change*
    (time 1 - time 2)



Objective: To improve scientific understanding of the linkages between coastal wetland habitats, adjacent uplands, and living marine resources

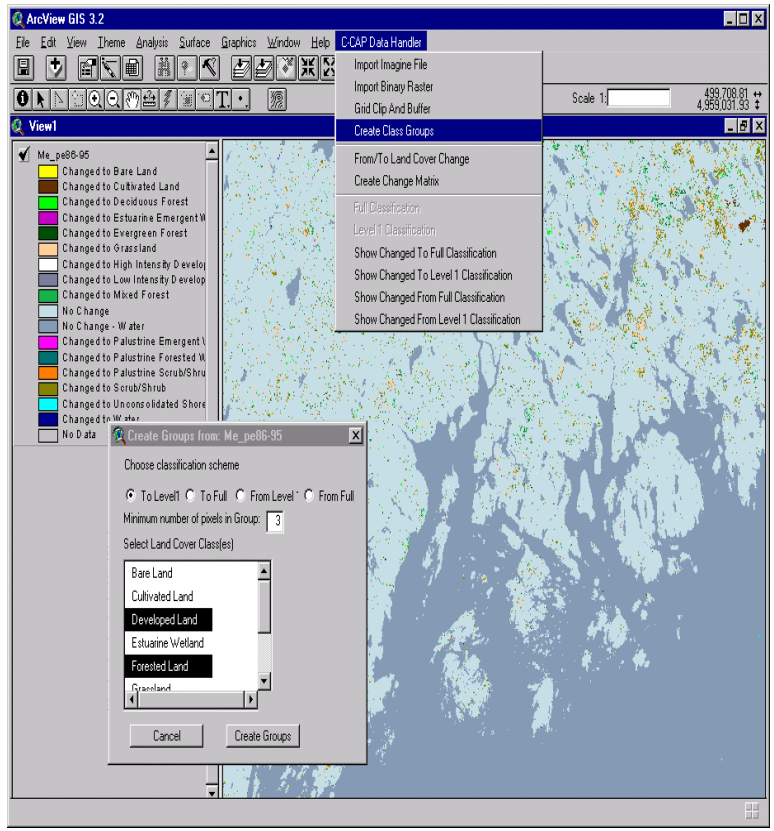
http://www.csc.noaa.gov/crs/lca/ccap.html

C-CAP Baseline Status



C-CAP Data Handlers and Access

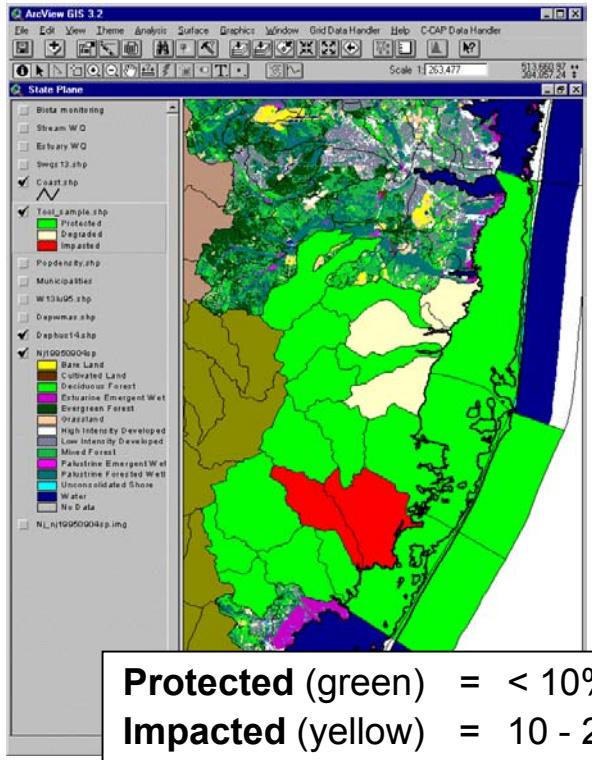
- Data Handler – ArcView 3.x
  - Analyzes and compares groups of related land cover classes
  - Applies standard legend to *change* data
  - Clips grid to shapefile
  - Creates buffers
  - Generates statistical change table
- Legend Handler – ArcView 3.x
  - Doesn't require Spatial Analyst Extension
- C-CAP Data Map Server for data access



http://www.csc.noaa.gov/crs/lca/tools.html

Impervious Surface Analysis Tool

- Estimates percent impervious surface of user selected areas based on land cover data
- Scenarios
  - Estimates watershed impacts due to landscape changes
- Uses existing land cover data (C-CAP or other formats)
- ArcView 3.x / ArcGIS 8.x Extensions
- Partnership Project
  - Nonpoint Source Education for Municipal Officials (NEMO) Organization

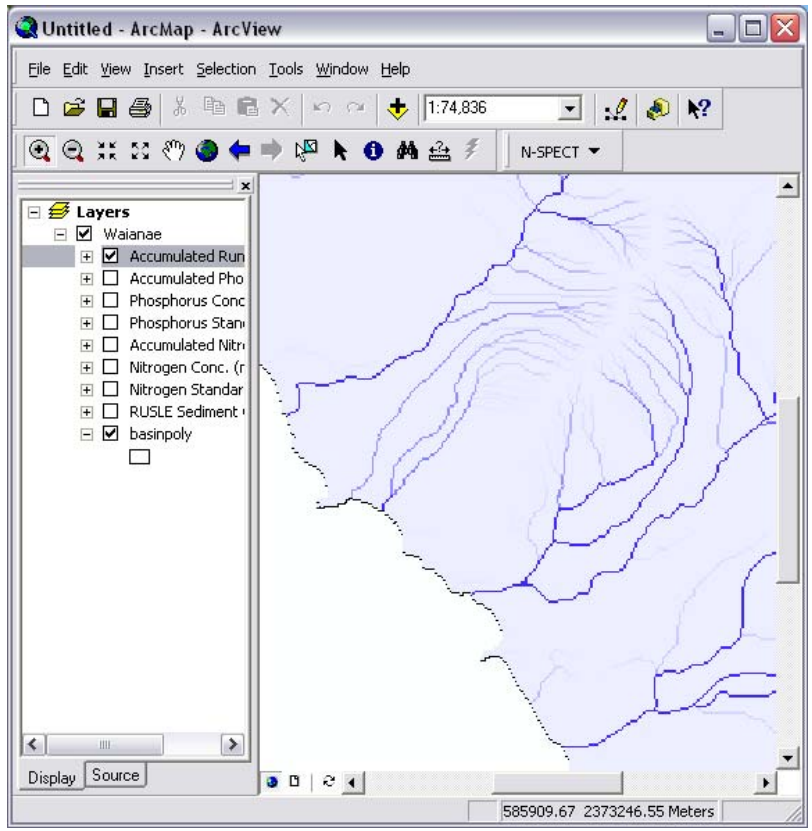


Protected (green) = < 10%
Impacted (yellow) = 10 - 25%
Degraded (red) = > 25%

http://www.csc.noaa.gov/crs/cwq/isat.html

N-SPECT

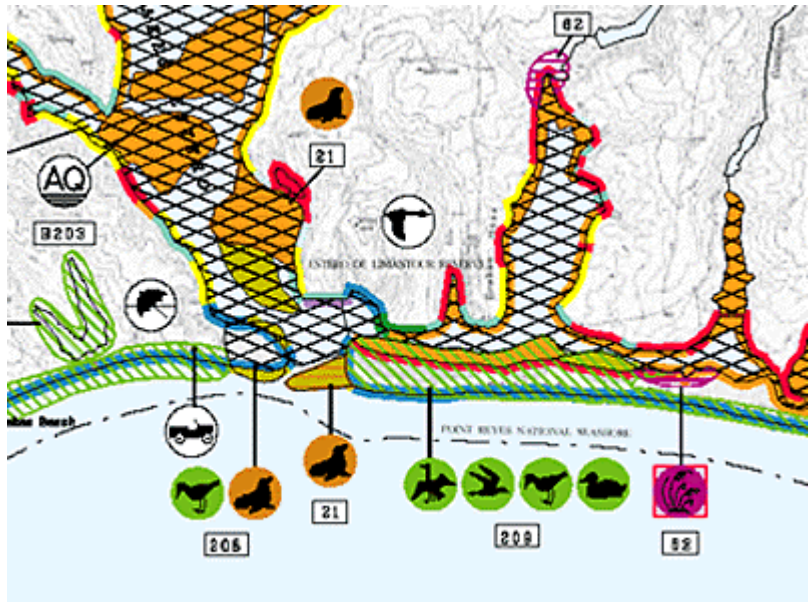
- Nonpoint-Source Pollution & Erosion Comparison Tool (ArcGIS extension)
- Help managers understand and predict impacts of management decisions on water quality
- Tool examines the relationship between land cover, nonpoint source pollution, and erosion
- Results will be useful for understanding and predicting the impacts of management decisions on water quality and, potentially, on coral health



http://www.csc.noaa.gov/crs/cwq/nspect.html

Environmental Sensitivity Index (ESI)

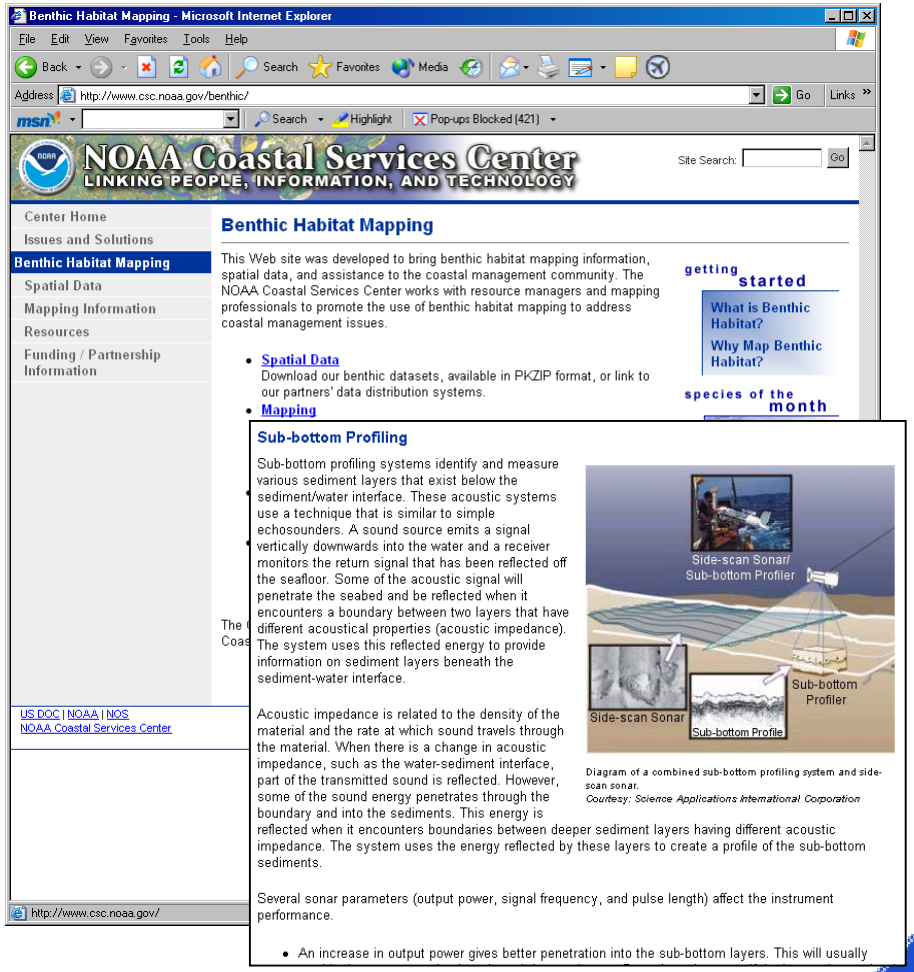
- ESI maps serve as quick references for oil and chemical spill responders and coastal zone managers
- Data includes:
  - Shorelines – Color-coded to indicate their sensitivity to oiling
  - Sensitive biological resources, such as seabird colonies and marine mammal hauling grounds
  - Sensitive human-use resources, such as water intakes, marinas, and swimming beaches
- Available for most coastal areas in the US
- Data formats include:
  - ArcExport, ArcView project, MOSS file, ESI viewer, PDF, and Paper Atlas



http://response.restoration.noaa.gov/esi/esiintro.html

CSC Benthic Habitat Mapping

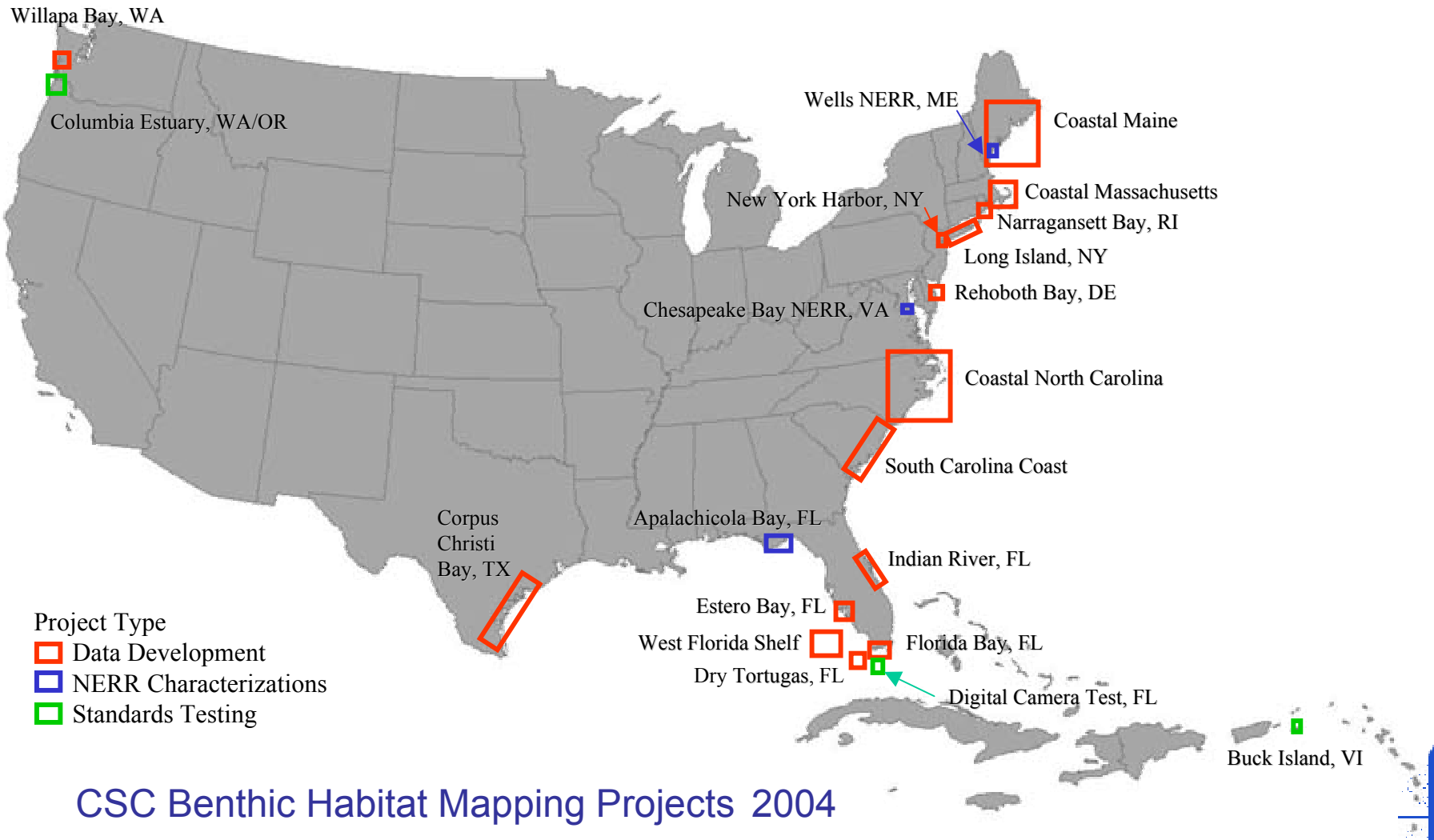
- Spatial Data
  - Downloadable data sets
- Mapping
  - Techniques
  - Classifications
  - Case studies
- Resources
  - Center products
  - Image gallery
- Funding/Partnerships
  - How to work with the Center



www.csc.noaa.gov/benthic/

NOAA Coastal S
LINKING PEOPLE, IN

CSC Benthic Habitat Data Availability

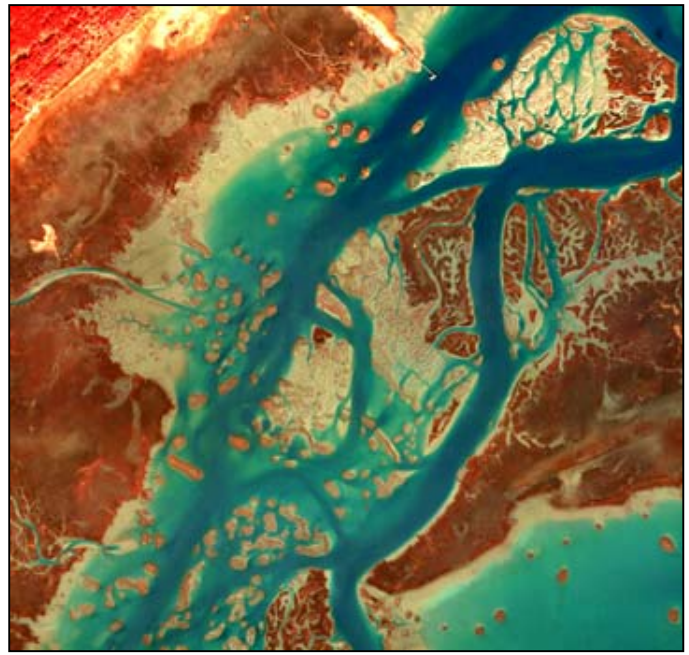


CSC Benthic Habitat Mapping Projects 2004

Data Development

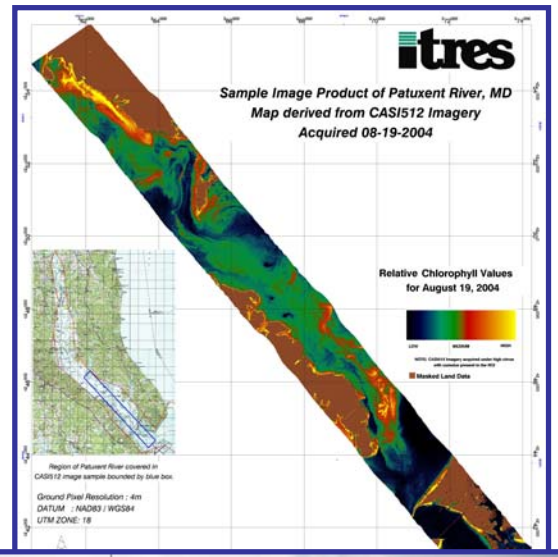
Benthic habitat

- South Carolina Oyster Habitat
  - Airborne imagery acquisition (GeoVantage)
    - Managing existing task order (2003)
    - Continuing acquisitions and QA reviews (target completion summer ’05)
  - Oyster mapping
    - Supporting SC DNR’s state-wide oyster mapping contract



Water Quality Remote Sensing

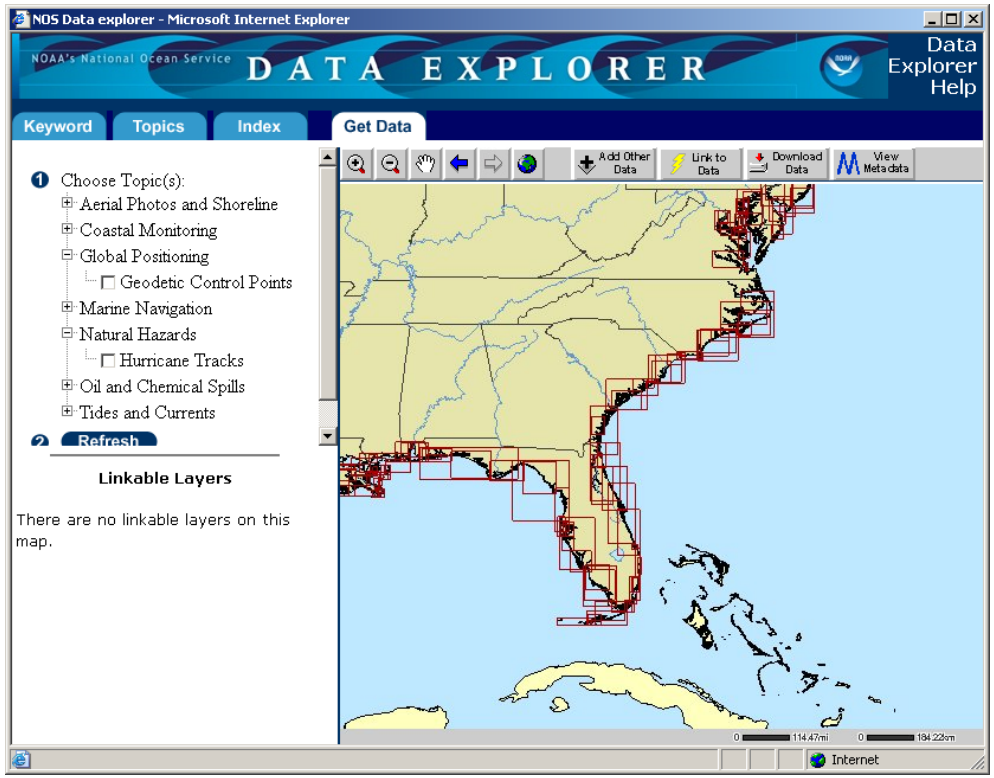
- Assessing current state of the art in operational water quality remote sensing
- Bringing together coastal managers, commercial vendors, and academics to share knowledge and demonstrate capability
- Four contractors collected data on Patuxent River, MD in mid-August
- MD partners (DNR & MDE) collected ground truth data
- Contractors will submit final data in late September
- Center compares ground truth data to remote sensing data and provides an assessment of capabilities



http://www.csc.noaa.gov/crs/cwq/

NOS Data Explorer

- Pre-operational data portal for selected NOS spatial data holdings
- Provides a variety of discovery, viewing, and data download tools
- Portal utilizes local data inventory but provides distributed access NOS datasets
- Currently over 100 metadata records and associated datasets accessible via the portal

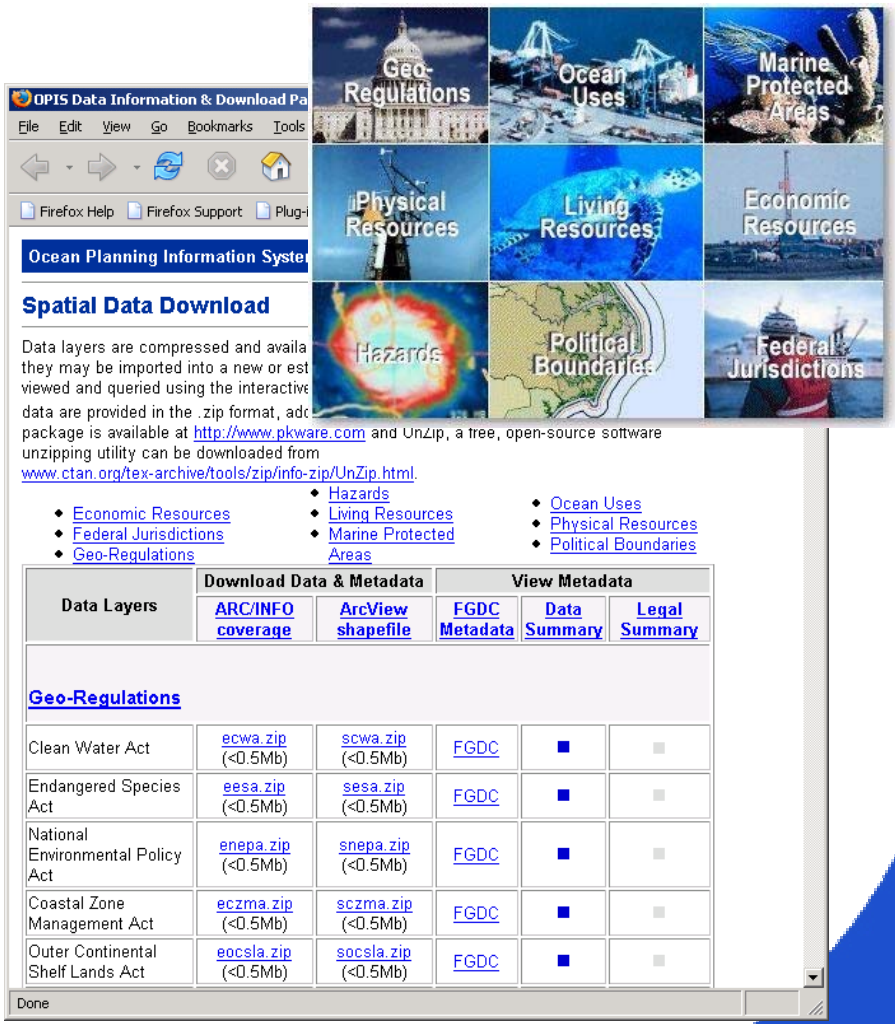


http://www.oceanservice.noaa.gov/dataexplorer/

NOAA Coastal Services Center
LINKING PEOPLE, INFORMATION, AND TECHNOLOGY

Ocean Planning Information System (OPIS)

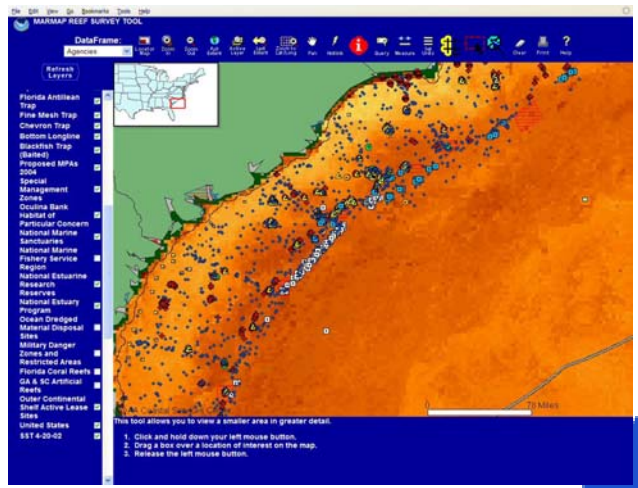
- Ocean planning information system to enhance regional and integrated approaches to ocean management in the southeast
- Over 100 spatial data layers and metadata in the following categories
  - Economic Resources
  - Federal Jurisdictions
  - Geo-Regulations
  - Hazards
  - Living Resources
  - Marine Protected Areas
  - Ocean Uses
  - Physical Resources
  - Political Boundaries
- Recently redesigned Web site and new ArcIMS mapping interface



http://www.csc.noaa.gov/opis/

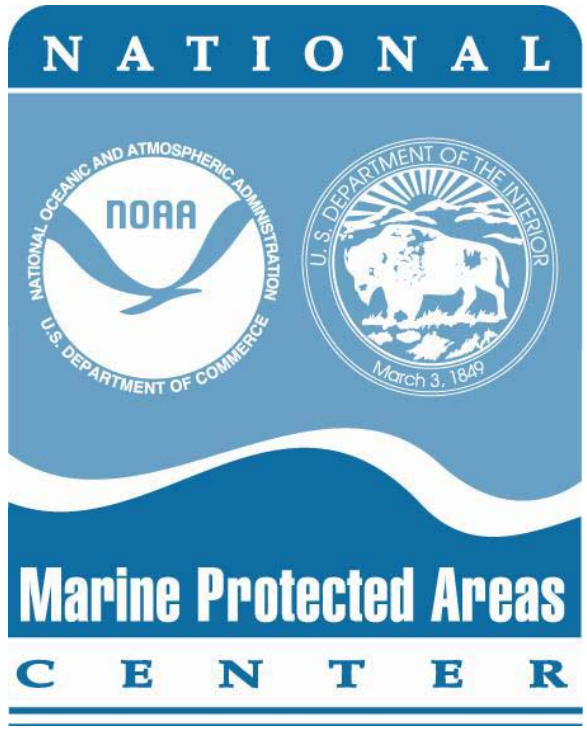
Fishery Data Access

- **CalFish** - Centralized California fisheries data storage, management, and retrieval system
  - CalFish is using Internet Map Server technology to map and provide on-line analysis of data from multiple agencies
  - CSC developing customized data access and analysis tools for ArcIMS application
- **SEA-GEOFISH** - SouthEAast-GEOgraphic Fishery-Independent Survey and Historical Database
  - Partnership with South Carolina DNR in the development of a data visualization and distribution tool
  - 27 years of fishery independent survey data
  - ArcIMS implementation with simple query functionality



MPA Decision Support Tool Inventory

- Document detailing decision support tools targeted at MPA management, siting, and evaluation
- Inventory is based on four primary criteria
  - GIS based
  - High utility for MPA processes
  - Publicly available (low or no cost)
  - Participatory or interactive
- Inventory will be finalized soon, but we will be adding to it throughout the year

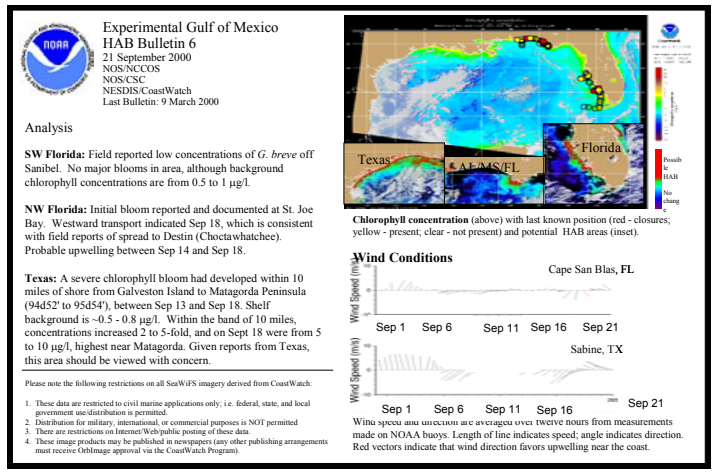


http://www.csc.noaa.gov/mpa/

Near Real-Time Forecast Bulletin

Harmful Algal Blooms

- Gulf of Mexico HAB bulletin
  - Transfer to CO-OPS
  - Investigate additional data, e.g., forecast transport model (ORR) output
  - Transfer HABMapS functionality to NCDDC
- Bulletin expansion to Pacific Northwest
  - Develop software plan; develop alpha version
  - Protocol for water quality remote sensing
- Begin to develop draft protocol for coastal managers
  - Provide guidance on selecting appropriate technologies



Experimental Gulf of Mexico
HAB Bulletin 6
21 September 2000
NOS/NCCOS
NOS/CSC
NESDIS/CoastWatch
Last Bulletin: 9 March 2000

Analysis

SW Florida: Field reported low concentrations of *G. breve* off Sanibel. No major blooms in area, although background chlorophyll concentrations are from 0.5 to 1 µg/l.

NW Florida: Initial bloom reported and documented at St. Joe Bay. Westward transport indicated Sep 18, which is consistent with field reports of spread to Destin (Choctawhatchee). Probable upwelling between Sep 14 and Sep 18.

Texas: A severe chlorophyll bloom had developed within 10 miles of shore from Galveston Island to Matagorda Peninsula (94d52' to 95d54'), between Sep 13 and Sep 18. Shelf background is ~0.5 - 0.8 µg/l. Within the band of 10 miles, concentrations increased 2 to 5-fold, and on Sept 18 were from 5 to 10 µg/l, highest near Matagorda. Given reports from Texas, this area should be viewed with concern.

Please note the following restrictions on all SeaWiFS imagery derived from CoastWatch:

1. These data are restricted to civil marine applications only; i.e. federal, state, and local government use/distribution is permitted.
2. Distribution for military, international, or commercial purposes is NOT permitted
3. There are restrictions on Internet/Web/public posting of these data.
4. These image products may be published in newspapers (any other publishing arrangements must receive OrbImage approval via the CoastWatch Program).

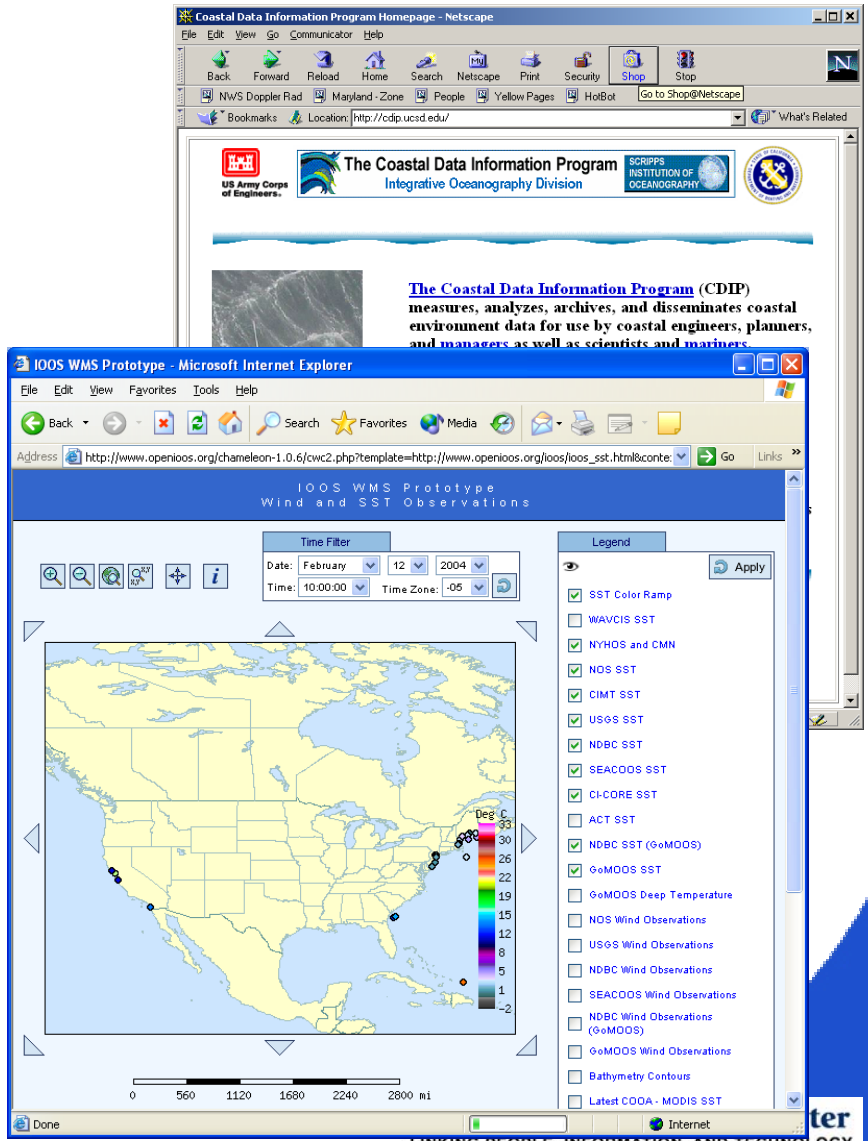
Chlorophyll concentration (above) with last known position (red - closures; yellow - present; clear - not present) and potential HAB areas (inset).

Wind Conditions

Wind speed and direction are averaged over twelve hours from measurements made on NOAA buoys. Length of line indicates speed; angle indicates direction. Red vectors indicate that wind direction favors upwelling near the coast.

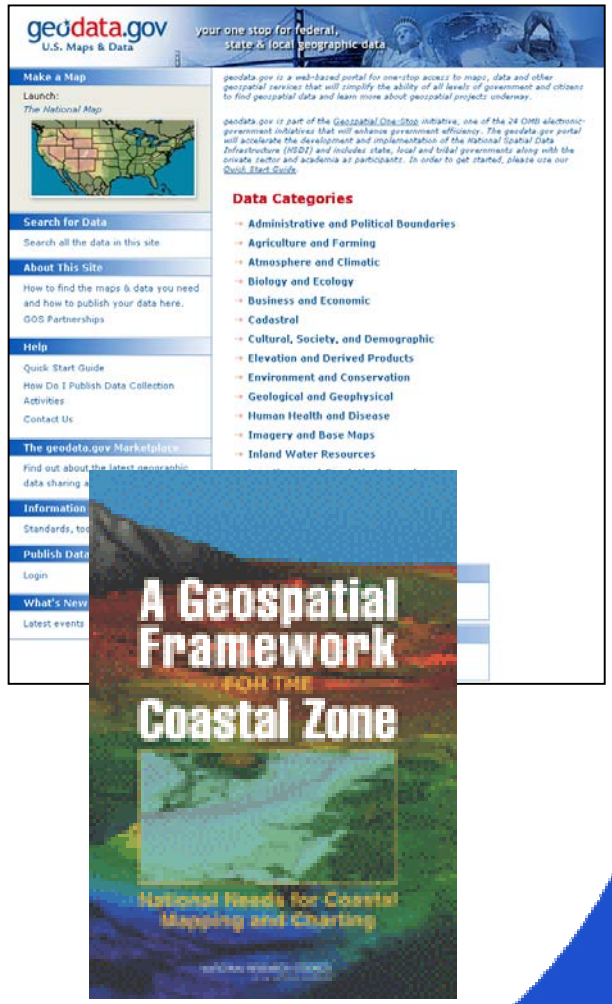
Coastal Observations

- **Chesapeake Bay Oyster Decision Support Tool**
  - Predicts larval transport for informed decision-making
  - GIS integration of regional monitoring systems (ships, buoys, satellites, etc.) and hydrodynamic models
- **Sea Surface Temperature (SST) Data Portal**
  - Compilation of real-time or near real-time data
  - Focus on interoperability
  - Multiple collaborators (federal, academia, and private industry)



Geospatial Coordination

- NOS leads NOAA participation in FGDC and GOS activities
  - DOC representative to the Steering Committee
  - Chair, Marine and Coastal Spatial Data Subcommittee
  - Co-Chair, Marine Boundary Working Group
  - Chair, Geodetic Control Subcommittee
  - Developing Coastal and Marine Components of Geospatial One-Stop
- National Academy of Sciences National Needs for Coastal Mapping and Charting



CSC Geospatial Training

- Coastal Applications Using ArcGIS
- GIS for Managers
- Assessing GIS for Your Organization
- Introduction to ArcGIS I
- Metadata Training
- Metadata Workshop Curriculum Materials
- Remote Sensing for Spatial Analysts

http://www.csc.noaa.gov/bins/training.html

Coastal Application Using ArcGIS

- Three-day hands-on GIS course including GPS field work
- Modules
  - Introduction to Coastal GIS
  - Visualizing Population Growth along the Coast
  - Impacts to Sensitive Habitats
  - Overview of the Global Positioning System
  - Field Data Collection
  - GPS Data Integration
  - Siting Marine Protected Areas
  - Relating Land Use and Water Quality

Remote Sensing for Spatial Analyst

- Two-day hands-on course using ESRI software
- Modules
  - Introduction to Remote Sensing
  - Land Cover Analysis
  - Benthic Habitat
  - Coastal Ocean Monitoring
  - Coastal Erosion

Metadata Training

- The Center offers a variety of training in metadata creation, validation, and publication
  - 2–Day Metadata class
  - Metadata Train the Trainer workshop
  - **"Introducing Geospatial Metadata"** comprehensive guide to presenting a two-day workshop on metadata

GeoTools '05
March 7-10, 2005

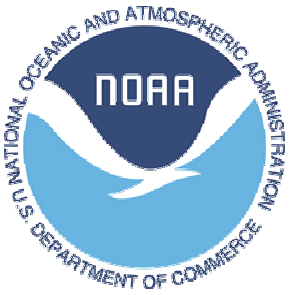
Goal: Promote the understanding and applied uses of geospatial data and tools for studying and effectively managing the coast

"The Premier Spatial Technology Conference for Coastal Resource Professionals"

Objectives:

- Promote geospatial tools, methods, and training needed for coastal management.
- Explore critical geospatial technology and training issues.
- Promote sharing of standards and coastal data through the National Spatial Data Infrastructure (NSDI) and identify the requirements.
- Enhance networks for developing public and private partnerships.

http://www.csc.noaa.gov/geotools/



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